
Conduction analysis in mixed cardiomyocytes-fibroblasts cultures using microelectrode arrays.

Journal: Conf Proc IEEE Eng Med Biol Soc

Publication Year: 2009

Authors: Shilpi Roy, Michael Q Chen, Gregory T A Kovacs, Laurent Giovangrandi

PubMed link: 19964347

Funding Grants: Technology for hESC-Derived Cardiomyocyte Differentiation and Optimization of Graft-Host Integration in Adult Myocardium

Public Summary:

Scientific Abstract:

Models for cardiac arrhythmia currently exist primarily in in-vivo and computer simulation form. Towards the development of such a model in-vitro, a better understanding of electrical conduction in heterogeneous cultures is required. Increasing ratios of cardiomyocytes and fibroblasts were cultured on 500x500 microm arrays of 36 microelectrodes to study the emergence and properties of action potential propagation in mixed cultures. A minimum ratio of 70% cardiomyocytes to 30% fibroblasts was found to be necessary for detection of electrical activity. However, the establishment of a continuous, homogeneous depolarization wave across the culture required a higher proportion of cardiomyocytes; even a 90:10 ratio was unable to consistently produce a unidirectional, uniform depolarization wave as is seen in controls. This model underlines the importance and sensitivity of tissue homogeneity in supporting electrical conduction, and is especially relevant to studies of arrhythmia (reentry) and stem cell grafts.

Source URL: <https://www.cirm.ca.gov/about-cirm/publications/conduction-analysis-mixed-cardiomyocytes-fibroblasts-cultures-using>